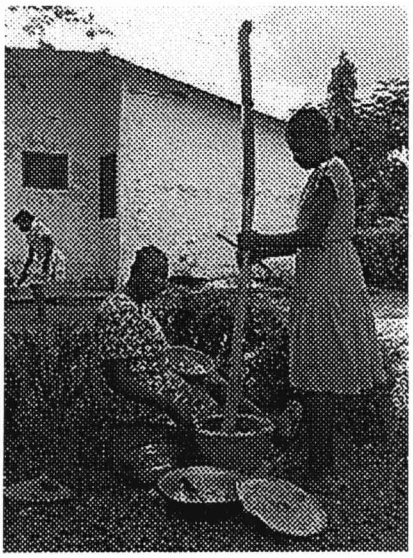

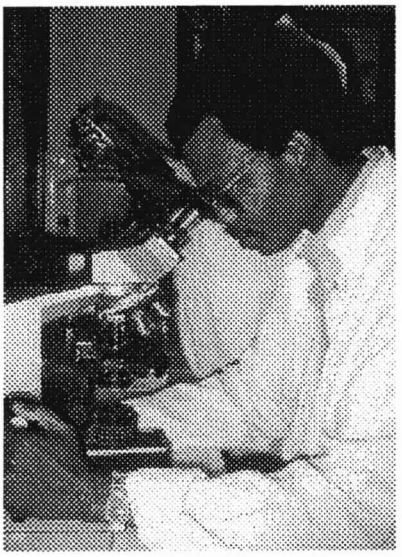

ORIGINS AND ACHIEVEMENTS OF THE NAVRONGO HEALTH RESEARCH CENTRE NAVRONGO, GHANA

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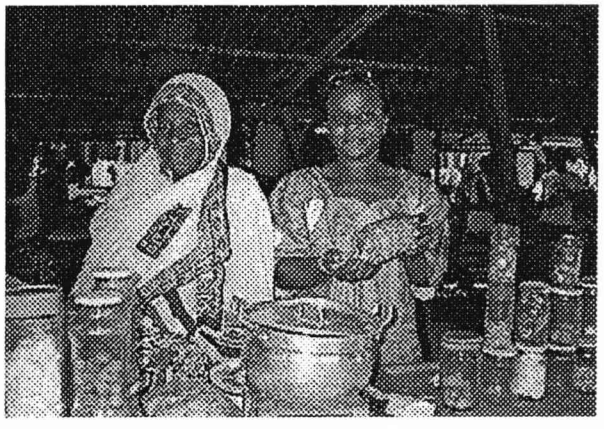
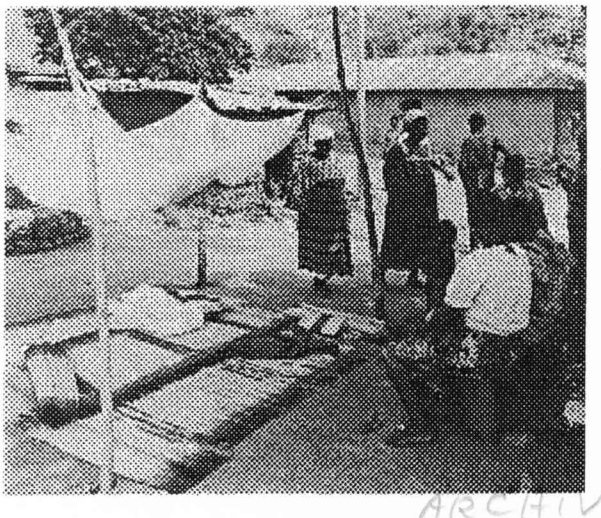




In May 1996, IDRC began discussions with the Navrongo Health Research Centre (NHRC) in Northern Ghana concerning the possibility of assisting it to conduct an institutional self-assessment using the framework published in "Institutional Assessment, A Framework for Strengthening Organizational Capacity for IDRC's Research Partners" (Lusthaus et al, 1995). In preparing for that exercise, IDRC's Evaluation Unit carried out a rapid review of the historical factors which influenced the institution's origins. Based on face-to-face, telephone, and e-mail interviews with fifteen people who have been associated with the events in Navrongo, this study highlights some of the factors which helped strengthen research capacity at the NHRC and indicates IDRC's role in bringing about these developments.

Introduction

Since its inception eight years ago, the Navrongo Health Research Centre (NHRC) has emerged as a world-class health research facility, a leader in African research studies, and a forerunner in applying new computer technologies. Located in the West African nation of Ghana, Navrongo is situated in the Upper East region. Ghana, nestled between the Ivory Coast and Togo, is a country of contrasts. Despite being exporters of gold and timber and having a national growth rate of 5% in 1994, Ghanaians are still vulnerable to the devastation drought or famine can bring. Navrongo is a rural community, population 10,000, with most of its inhabitants engaged in subsistence agriculture on the town's outskirts. Navrongo does not have regular electricity and running water, and is located in a region where the literacy levels, child survival rates, and health indicators are all lower than Ghanaian averages. Its sanitation, water, and telecommunications systems are totally inadequate. In this setting, isolated from the world's scientific community but in the midst of highly prevalent, serious health problems characteristic of the guinea savannah region of Africa, the NHRC's reputation for scientific excellence stems from important findings in several of its recent projects. The NHRC has conducted two of the largest field research trials ever carried out in Africa, namely the Vitamin A Supplement Trials (VAST) and the Malaria Bednet Trials, and **combined they demonstrate a 40% reduction in total child mortality**. The success of the NHRC demonstrates that field research on major health problems can successfully be tackled by small, local institutions.

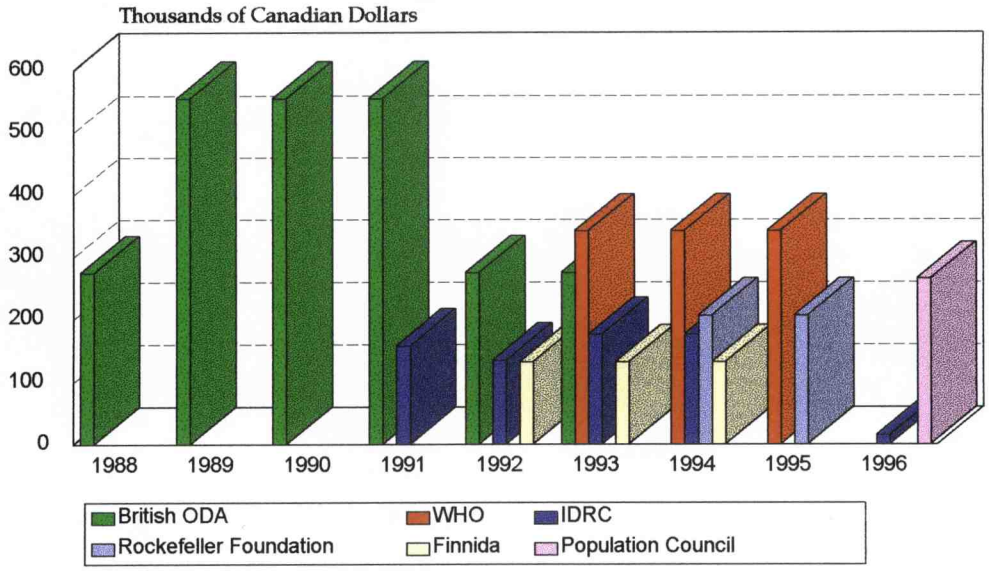
How Did This Research Get Done?

NHRC's mandate is to conduct applied health research. It is committed to increasing awareness about health development problems such as malaria and child mortality, changing high-risk behaviour through education, and finding inexpensive solutions to common health concerns. It operates on the principle that high-quality, local health research, carried out with an understanding of cultural norms and values, can vastly improve the quality and delivery of health-care in the region. The NHRC's outlook accords particularly well with IDRC's emphasis on applied research, the development of local leadership, indigenization of skills, and international scientific networking.

> *"I think the most influential factor in the development of NHRC is the caliber of leadership and commitment shown by various researchers in the Centre to ensure that the quality of work done is really high. This has had a positive impact in the sense that it has engendered trust in the Centre by various institutions both locally and within the international community to the extent that people are prepared to commit resources to doing work in Navrongo."*
>
> *- Bawah Ayaga, Researcher, NHRC.*

The capacity of the NHRC to conduct research has attracted the attention of a number of international donor organizations. Since IDRC's initial support, donor agencies such as the Mellon Foundation, the Rockefeller Foundation, and the Population Council (Thrasher funded) have actively pursued collaborative projects with the NHRC, believing it to be an exemplary case of using local skills to solve local problems. Below, figure 1 shows total donor funding received by the NHRC since 1989.

Figure 1: NHRC Donor Funding



History

First Funding: The British Overseas Development Administration (ODA)

NHRC's origins can be traced to the selection of the remote town of Navrongo as one of the African field sites for the Vitamin A Supplement Trials (VAST). The primary goal was to investigate whether large doses of Vitamin A, administered every 4 months to children over six-months old, would affect their survival. British ODA funded the project through the London School of Hygiene and Tropical Medicine (LSHTM). In October 1988, Dr. David Ross, a Canadian working at the LSHTM, arrived, converted two residential cottages adjacent to Navrongo's War Memorial Hospital into VAST site offices, and set about assembling the necessary staff and resources for the project. Dr. Fred Binka, a Ghanaian doctor and dedicated researcher, became the full-time Director in March 1989.

VAST mapped the communities in the district and conducted a census which brought 90,000 people under continuous demographic surveillance. The impact on mortality and morbidity among 21,966 children under 5 years of age from 9,805 participating residential compounds was closely monitored and all data were

VAST Research Results

- 44% of children under 6 possessed poor nutritional status;
- anaemia was prevalent among younger children;
- 14.6% of compounds had at least one case of goitre;
- 12.6% of compounds had at least one case of elephantiasis of the leg;
- less than 1% of children slept under a bednet to reduce the risk of contracting malaria;
- **the regular administration of the Vitamin A supplement reduced total child mortality by 23% mostly from measles and diarrhea.**

analyzed on site. As of May 1991, research showed a 23% reduction in mortality among children taking the Vitamin A supplement. Having answered its specific research question, however, British ODA was set to terminate support for the research facility that had grown to encompass 125 staff and a fully operational demographic surveillance system.

IDRC Recognizes The Research Potential

Appreciating the extraordinarily high-quality field-research in the VAST work at Navrongo and interested in keeping alive this capacity in order to conduct further research on life-saving interventions in this part of Africa, IDRC's Dr. Don de Savigny and two other Program Officers visited the nascent research centre in late 1990. They quickly recognized an opportunity to use the existing demographic surveillance system to carry out case-control research to search for other mortality reducing measures. Such an undertaking would have been exorbitantly expensive had it not been for the capacity established through VAST. In early 1991, as a first step, IDRC funded an 18-month study of child mortality risk factors. The study sought to discover the factors that make child mortality rates in the upper regions of Ghana among the highest in Africa. This population-based case-control study looked at the major environmental, socio-economic, and cultural risk factors for child deaths in order to develop future community-based interventions to improve child survival. The project was put in place quickly enough to benefit from the final year of the British ODA-funded research. As VAST wound down in late 1991, IDRC convinced British ODA to leave behind the computers and research equipment for future projects.

Results from the Child Survival and Health Study

Risk Factors for Child Mortality

- lack of breast-feeding after birth;
- having had measles;
- a birth interval of less than 24 months;
- death of mother;
- an abusive father;
- use of water sources other than pump equipped boreholes or wells during the wet season.

Not Significant Risk Factors

- religious beliefs;
- polygamy;
- compound sanitation (including presence of human/animal excreta, refuse in the living area, and availability of soap);
- knowledge, attitude, and practices of guardians regarding malaria and measles.

> *"ODA was not in the position to recognize or capitalize on the gem they had helped create, and it was in danger of being lost to Ghana and to Africa."*
>
> - Dr. Don de Savigny, Health Sciences Specialist, IDRC.

Matlab and the Ministry of Health

Soon thereafter, Jim Phillips of the Population Council came to Navrongo looking for an African institution interested in adopting the Matlab demographic surveillance system which was developed in Bangladesh and supported by CIDA. Phillips found that the Navrongo Centre, facing a precarious

financial future, was looking for new initiatives. The Matlab system, with some modification, fit well with the kind of work Dr. Binka and his research team were conducting. Funding was assembled through the Population Council and other donor agencies to develop a new Household Registration System as an African version of the Matlab demographic surveillance system (DSS). This system is now known as the Navrongo DSS.

In 1992, as a result of its impressive research achievements and some lobbying, the Centre formally adopted the name the Navrongo Heath Research Centre (NHRC), and was declared a district health research unit linked to the Ghanaian Ministry of Health. The NHRC has been granted more autonomy than most government facilities, frequently operating in a parastatal fashion; it is free to access ministry funds, do policy research, establish international linkages, and enter into its own international financial arrangements.

Two New Information Technologies

IDRC's familiarity with the evolution of NHRC's research capacity enabled it to identify and assist in the addition of two new information technologies essential to future high-quality research: Geographic Information Systems (GIS); and, a satellite communications hook-up to HealthNet. Geographical referencing greatly enhances demographic surveillance and intervention trial research in the dispersed settlements of Northern Ghana. The NHRC needed GIS capability in order to analyze the data from the Vitamin A trials and to implement a methodology for conducting research on vector borne diseases such as malaria.

> *"When you have ideas, IDRC are the people who listen to you and try to help you out."*
> - Dr. Fred Binka referring to the GIS system funded by IDRC.

> *"The Navrongo Demographic Surveillance System and the GIS have become the backbone of major research activities at the Centre."*
> - Dr. Alex Nazzar, Assistant-Director, NHRC.

Through a linkage between NHRC and McMaster University, supported by IDRC, Canadian health and GIS experts collaborated with NHRC. This made it possible for Dr. Binka to obtain training and funding for the equipment necessary to recruit a full-time GIS staff member for the NHRC. This staff member, an expatriate Ghanaian working in Finland, was located via the Internet using another technological innovation supported by IDRC -- SatelLife/HealthNet, a satellite-based communications service. The HealthNet Project was designed specifically for remote African health research sites, which do not have stable or reliable telephone connections. The project aimed to connect these sites via satellite to the Internet, e-mail, and other electronic resources. Navrongo was chosen as a satellite ground station and the necessary equipment was set up at the NHRC. This station can upload or download messages and data from a dedicated health communications satellite that passes overhead several times a day.

> *"HealthNet allowed us to be part of the modern world."*
> - Dr. Fred Binka, Director, NHRC.

"I have used HealthNet to communicate to people at the Population Council in New York, PATH Canada, and the WHO to discuss issues related to research and research protocols."
- Philip Adongo, Researcher, NHRC.

When connected and functioning, HealthNet has proven to be a powerful tool for NHRC. It provides access to world-wide bibliographic materials, increased scientific capacity; and, enables staff to secure resources to participate in fora that would otherwise have been inaccessible. Furthermore, simply having an e-mail address gave NHRC's professional morale and national and international status a huge boost. Unfortunately, the HealthNet project experienced difficulties and there were times when service was intermittent and a long period when the connection did not operate. Rectifying the complex problems with the satellite link involved both technical and human understanding. In the end, it took action on the part of several parties, including intervention by IDRC, to identify and resolve the problems. Today the connection is up and fully functional. Some of the data in this report was obtained by e-mail, via satellite, directly from Navrongo. One lesson from the HealthNet project is that intensive human support is essential to successful technological introduction and maintenance. This lesson has been operationalized at SatelLife in that they now budget substantial amounts for training and follow-up support in all their projects. Further, the introduction of new technologies is not, in itself, the goal and any new instrument should be treated as a tool to help facilitate broader economic, social, or political development.

"Clearly IDRC was a tremendous boost to getting SatelLife/HealthNet back up"
- John Mullaney, SatelLife.

"It's not enough to drop technology in people's lap, slap-dash train them and let it go at that!"
- Edson Pereira, SatelLife.

Providing NHRC with access to HealthNet also constituted IDRC's initial contribution to the Navrongo centre's involvement in the Malaria Bednet Trials. The Malaria Bednet Trials were funded by WHO and IDRC with Kilifi, Kenya and Navrongo, Ghana chosen as test-sites. Research completed in Navrongo evaluated the effects of mosquito bednets treated bi-annually with Permethrin insecticide on childhood mortality. Bednets are considered essential because it is primarily during the pre-dawn hours when the Malaria-infected mosquitoes prey on sleeping children. A child averages 100 bites by malaria-infected mosquitoes per year and the insecticide-treated bednets provide an effective physical barrier to the mosquitoes. The research findings were staggering, among the 120,000 children using the bednets there was a 17% decrease in total child mortality from various causes and a 40% decrease in the number of children admitted to hospital with malaria. These findings have helped shift the focus of research from proximal determinants to underlying determinants of health which permits a more holistic approach to disease prevention.

Results from the Malaria Bednet Trials

- 17% reduction in child mortality;
- 40% reduction in hospital admissions due to malaria.

"Without IDRC support, (on the Malaria Bednet Trials) there was going to be a big problem!"
- Dr. Fred Binka, Director, NHRC.

The NHRC Today

Today, with support from several external donor agencies, the NHRC is a mecca for health research in Africa and is influencing research in other Southern regions as well. At the same time, it has a strong voice in Ghana's national health policies while simultaneously improving the health of the people in its own district.

Internationally, the research technologies developed by NHRC have been influential. It has shared its GIS techniques with researchers in Sri Lanka and other parts of Africa. Demographic surveillance, a core scientific resource in community health research, is one of NHRC's internationally recognized strengths. The Navrongo Surveillance System, with its technical support team, documentation etc. has been used as a demonstration and training "centre of excellence" and as a model for Household Registration Systems for other sites. Replication is currently taking place in Tanzania in support of IDRC's Essential Health Interventions Project (EHIP). It is also being transferred to the Gambia, has been completed in Uganda, and is being considered in Egypt and Burkina Faso. The high quality research being conducted by NHRC has propelled them to the position of trainer for other Southern scientists.

The Navrongo researchers present and publish their work widely. Their findings on malaria and Vitamin A supplements have contributed to changes in international health interventions by agencies such as the WHO, UNICEF, and the World Bank.

At the national level, the NHRC is prominent and influences government policy and public thinking. It has set standards which the Ghanaian Ministry of Health is now assisting to disseminate to other districts. NHRC also holds an annual workshop for journalists in order to sensitize them to community health issues. This year the workshop resulted in the declaration of March as National Malaria Awareness Month in Ghana.

Reversing brain drain is another achievement of the NHRC. Realizing that talented, professional scientists are the key to the NHRC's success, Dr. Binka is committed to the development of African scientists and actively recruits Ghanaians from abroad as well as locally. Via Internet, Dr. Binka has successfully located and recruited more than half a dozen expatriate Ghanaians working elsewhere in the world with skills required at Navrongo. Having access to the global research community and the opportunity to conduct world-class research holds them there.

"Good scientists won't stay if they're isolated, it's a human problem not a technological one!"
- Dr. Jim Phillips, Population Council.

Locally, in its own district, the NHRC has had a significant effect on people's health. The positive effects of the Vitamin A supplements and bednets were quickly recognized and appreciated by the local population. For example, upon witnessing the effectiveness of the bednets in preventing malaria, local residents were unwilling to wait for the conclusion of the study and clamoured to purchase the bednets for themselves.

Collaboration with the adjacent War Memorial Hospital has grown over the years to include donation of a computer, assistance with computerized record keeping, clinical work, and the analysis of hospital data. Currently, they are working on a joint study of the prevalence of Female Genital Mutilation in the region. Further, NHRC helped influence USAID to provide the hospital with additional laboratory equipment and staff.

What Was IDRC's Contribution?

The growth of NHRC over 8 years from nothing to a prominent scientific institution with 14 researchers and national and international stature was not the result of a single factor; rather it grew out of the intersection of many factors. The creation of a demographic research base led by Dr. David Ross for VAST provided a platform for the IDRC-funded case-control research technology used in the child mortality studies. Coupled with the scientific leadership and managerial prowess of Dr. Fred Binka and the commitment of his team, this experience provided a launching pad for the Matlab surveillance system funded by the Population Council and other donors. These capabilities were consolidated and extended with the introduction of GIS technology and access to the HealthNet satellite communications system, both funded by IDRC. NHRC could now attract highly skilled Ghanaian scientists to this remote location and secure donor funding for world class research such as the WHO/IDRC bednet trials and the Population Council/ Rockefeller Foundation/USAID funded family planning studies.

In summary, IDRC's main contributions fall into 4 categories: financial support; technical support; information technologies; and networking.

Financial Support: Funding was furnished for research projects such as 'Child Survival and Health in the Guinea Savannah', 'Determinants of Immunization Coverage', and 'The Malaria Bednet Trials'.

Technical Support: Program staff encouraged and influenced NHRC researchers to use a case-control methodology and to include a social-science research component.

New Information Technologies: HealthNet/SatelLife and GIS.

International Scientific Networks: HealthNet, Africa-GIS, Health-GIS, Collaboration for Mapping Malaria Risk, MARA Network.

IDRC's support was catalytic; it built and provided access to additional research capacity. The child mortality studies drew on the census data created in the Vitamin A trials. The addition of a social-science component to the Vitamin A trials enabled the researchers to gauge community reaction thereby maintaining full community support and participation. GIS capability made the demographic surveillance system more powerful. HealthNet provided access to global scientific resources. The cost-effectiveness of the bednet research was due to the Household Registration System and other aspects of demographic research capacity already established at NHRC. IDRC was close enough technically to understand the needs and propose useful solutions; flexible enough to be able to help; add only what was needed; and, able to identify where global partnership would be beneficial.

> *"Since IDRC convinced us, we have social science aspects in all our research."*
> - Dr. Fred Binka, Director, NHRC.

> *"IDRC has made a unique contribution to world public health. Its technical capacity to directly support researchers rather than channelling it through a Northern University allows more innovation than through traditional channels. This is a different approach which will not be taken up by other funders."*
> - Dr. David Ross, London School of Hygiene and Tropical Medicine.

> *"IDRC's skilled and flexible support helps identify priorities and solve problems with great flexibility and small amounts of money."*
> - Dr. Jim Phillips, Population Council.

> *"The major strength is with small amounts of money, it can commit to a longer time scale that other donors can think about. IDRC support is disproportionately effective, going way beyond the small amounts of money it puts in."*
> - Dr. David Ross, London School of Hygiene and Tropical Medicine.

> *"IDRC has provided very unique ways of working with us, they never applied pressure. This is quite unique for a donor agency.... We thought other donors should be more like IDRC."*
> - Dr. Fred Binka, Director, NHRC.

Conclusion

Relative to the small amount of funding provided, IDRC has played a disproportionately important role in the enhancement of the NHRC's research capacity over the past six years. How was this possible? What in IDRC's mode of operation made it choose a potential winner; place its support in key strategic areas; and effectively bring about change? From the experience in Navrongo, five factors (with examples in brackets) exemplify IDRC's aptitude in maximizing the potential of its partner institution.

1) Technical Expertise

Technical and scientific knowledge enabled program staff to assess, innovate, and exert influence in responding to research needs (*use of VAST census base, addition of social sciences research components, adoption of case-control methodology*). This also allowed IDRC to convene the cooperation necessary to achieve results (*introducing HealthNet and intervening to rectify the problems when the satellite station was down);*

2) Administrative Flexibility

Flexibility in delivering project support allowed IDRC to respond with exactly what the situation required within a realistic time-frame (bridge funding for the Bednet Trials);

3) Direct Contact

Direct knowledge of the field situation and of work being applied elsewhere allowed relevant and adaptable ideas and technologies to be introduced (GIS, HealthNet, case-control methods);

4) Networking

IDRC's professional contacts and linkages enabled it to offer contacts and networking opportunities to partner institutions (HealthNet, Africa-GIS, Health-GIS, MARA);

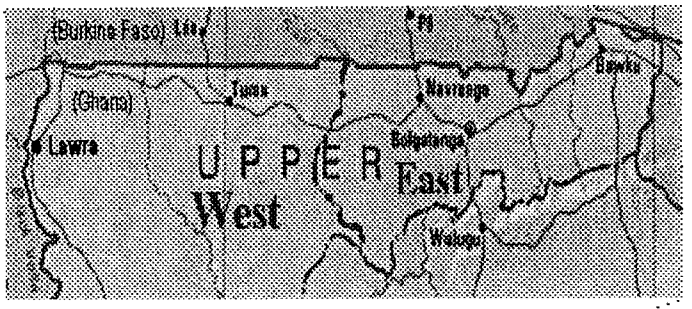
5) Southern Empowerment

Respect for, and devolution of control to, Southern researchers enhanced the commitment and participation of the primary stakeholders and the sustainability of the results (*researcher and community commitment to completion of bednet research*).

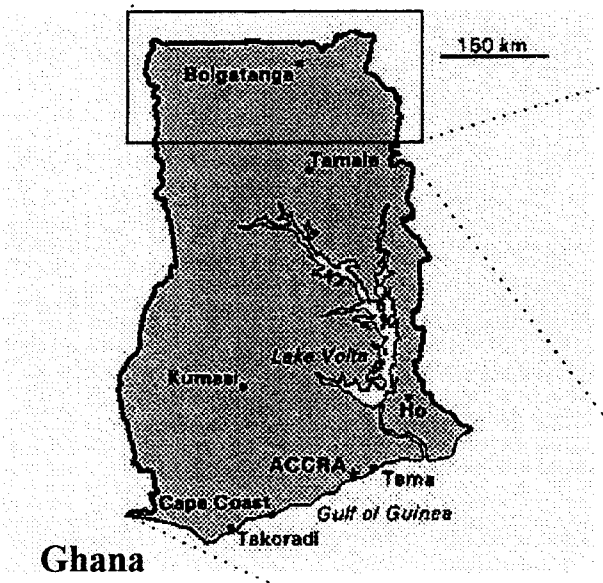
Annex 1: List of Interviewees

Population Council	Dr. Jim Phillips
IDRC	Dr. Don de Savigny Jenny Cervinskas Renald Lafond Bertha Mo David Balson
Peace Corps	Corey Johnson Beverly Johnson
SatelLife	John Mullaney Edson Pereira
NHRC	Dr. Fred Binka Philip Adongo Bawah Ayaga Alex Nazaar
London School of Hygiene and Tropical Medicine	Dr. David Ross

Annex 2: Maps



Upper East Region -
Research Area



Ghana